# SELECTIONS FROM THE RECORDS

OF THE OFFICE OF THE

# FINANCIAL COMMISSIONER, PUNJAB.

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CONTENTS:

## SELECTIONS FROM THE RECORDS OF THE FINANCIAL COMMISSIONER'S OFFICE, No. 26.

### No. LIV.—PROPOSALS FOR THE SYSTEMATISATION OF FUTURE SURVEY OPERATIONS IN THE PUNJAB.

No. 835, dated 28th July 1884.

From—R. G. THOMSON, Esquire, Offg. Senior Secretary to Financial Commissioner, Punjab,
To—The Offg. Junior Secretary to Government, Punjab.

With reference to your No. 260 of 17th November last, I am directed to submit in original the correspondence noted on the margin, and to convey the following remarks and recommendations of the Financial Commissioner on the subject of the future operations of the Survey Department in the Punjab.

1. Commissioner of Settlements and Agriculture, No. 501 of 12th December 1883.
2. This office No. 65 of 2nd January 1884.
3. Commissioner of Settlements and Agriculture, No. 4 of 3rd January 1884.
4. This office No. 354 of 14th January 1884.
5. Commissioner of Settlements and Agriculture, No. 28 of 14th January 1884.
6. This office No. 530 of 19th January 1884.
7. to 9. Deputy Surveyor-General's Nos. 149 and 150 of 16th February and No. 151 of 18th February 1884.
10. This office No. 2062 of 15th March 1884.
11. Commissioner of Settlements and Agriculture, No. 54 C. of 27th June 1884, and enclosures.

2. I am to explain that the correspondence which has taken place showed some divergence of view between the authorities of the Survey Department and the Commissioner of Settlements and Agriculture as to the form of survey operations which would be most useful in the Punjab. Accordingly, after the issue of this office No. 2062 of 15th March last (which is the tenth enclosure to the present letter), the Financial Commissioner talked the matter over with Colonel Wace, and suggested that he should endeavour to arrange a meeting with the Surveyor-General, and, in consultation with him, to devise a plan by which the result of the patwári survey could be incorporated with the records of the scientific survey in the manner suggested in paragraph 4 of the Government of India Circular No. 45 S. of 4th September 1882. This suggestion was adopted; and the result is shown in the joint report prepared by the Surveyor-General and the Commissioner of Settlements and Agriculture, and forwarded by the latter officer in his No. 54 C. of 27th June last, which, with its enclosures, forms the eleventh enclosure of the present letter.

3. The plan of future operations described in the joint report appears to the Financial Commissioner to solve very happily all the difficulties which at first suggested themselves to the superior officers of the Survey Department, and to hold out a satisfactory promise of success. This result, if attained, will be secured at less than half the cost of a survey carried out on the system recently followed in Hissar. The Financial Commissioner now proceeds to notice in order the various proposals made.

4. First, it is now stated that the system of modified topographical survey followed in the Hissar district appears to be unnecessarily elaborate, and that the method of patwári survey by squares, which has been recently established, will

enable us to introduce considerable simplifications into the system followed in Hissar without any sacrifice of the advantages which that system gives for the plotting of fields or the delineation of topography. It is therefore proposed to abandon the Hissar system, and in place of it to substitute a traverse survey which would fix permanently not fewer than two points in every village. These points would be, as far as possible, placed on *sihaddas* or tri-junction platforms, which would do away with the necessity for separate masonry marks. This scheme appears to the Financial Commissioner to be sufficient and simple, and he begs to recommend it to Government for approval. It is estimated to cost about Rs. 10 per square mile on the average, and its adoption would therefore cause considerable economy, as the Hissar system costs Rs. 25 per square mile.

5. Secondly, it is proposed to reduce the patwári maps, by photography or otherwise, to a scale of two inches to the mile. These reduced maps would then be tested *in situ*; and, if found sufficiently accurate, the topographical results which they supply would be utilised by the Survey Department for the preparation of the revised editions of the two-inch topographical maps from time to time issued by the Survey of India. This proposal also commends itself to the Financial Commissioner, who desires to recommend it for the sanction of Government.

6. Thirdly, it is proposed to have a scientific survey of all the riverain country in the Punjab which is subject to fluvial action. This survey would be so conducted that its results could be utilised by patwárís for the restoration of obliterated boundaries. This proposal also the Financial Commissioner recommends to Government for sanction; in doing so I am to explain that the scientific survey could, of course, only lay down fixed boundaries where these already exist, and at the outset they would therefore confine their operations to districts in which village boundaries do not vary along with varations in the course of the stream on which the villages are situated. But the Financial Commissioner has at present under his consideration proposals for the gradual abrogation of the inconvenient and otherwise objectionable deep-stream rule, in place of which the better system of fixed village boundaries would be substituted. If these proposals be adopted, the help of the scientific survey in carrying them out would be invaluable.

7. The establishment which is proposed for carrying out the above purposes is made up of a Deputy Superintendent of Survey with his office, two traverse parties, and two topographical test parties. It is proposed that this establishment should be sanctioned permanently for provincial work in general, and not for any particular survey. The Deputy Superintendent would be in general charge, and in direct correspondence with the Financial Commissioner, with whose wishes as to the order in which work should be undertaken he would generally comply. He would be empowered to organise the strength of his parties according to his discretion within the sanctioned scale.

8. The traverse parties would be employed one on surveys according to the simplified Hissar traverse system, and the other on riverain boundary work. It is proposed (and the Financial Commissioner approves of the proposal) that the first party should commence the survey of the Ferozepore district in October next upon the modified Hissar plan. No specific area is indicated for the riverain boundary survey; but if the proposals of the joint memorandum are sanctioned, the Financial Commissioner will be prepared to supply this omission.

9. The topographical test parties it is proposed to employ in compiling from the patwári maps of Ráwalpindi, Hoshiárpur, Jullundur, Ludhiána, and Umballa. The Financial Commissioner accepts this proposal, although he is



aware that some difficulty may arise from the very general absence of any permanent records on the ground of the data of the old scientific surveys of these districts. But such permanent marks as village sites, roads and other topographical features (which were always plotted in the revenue survey maps) will no doubt be available; and with the help of these there ought to be no great difficulty in testing the reduced patwári maps in the manner indicated by Colonel Coddington. And the patwári survey is now so accurate, and plotted on so large a scale, that when reduced to the 2-inch scale any slight errors in the maps would be inappreciable.

10. The full cost of these proposals is estimated at Rs. 72,070 per annum, which appears to be within the cost of the one-and-a-quarter parties which Government has already expressed its willingness to sanction. As to the apportionment of this cost between the topographical and revenue survey, the Financial Commissioner agrees with the authors of the joint memorandum that three-fourths should be a topographical and one-fourth a revenue survey charge.

11. The remainder of the memorandum may be dealt with more briefly. For the reasons given in paragraph 14 thereof, the Financial Commissioner agrees with the joint memorandum in thinking that all the survey parties should recess at Simla, and that all new recruits whom they may enlist should be natives of the Punjab; and he further desires to state that he considers the arguments in the 16th paragraph of the memorandum to possess much force. They have the entire concurrence of Colonel Davies.

12. I am to request the favour of very early orders on this letter.

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No. 54 C., dated Simla, 27th June 1884.

From—Lieut.-Colonel E. G. Wace, Commissioner of Settlements and Agriculture, Punjab,

To—The Offg. Senior Secretary to Financial Commissioner, Punjab.

In reply to your No. 2062, dated 15th March, I have the honor to report that the subject of future survey operations in the Punjab, whether for topographical or for river survey work, has been very carefully discussed between the Surveyor-General of India and myself, and I submit herewith a joint memorandum by that officer and myself, in which the conclusions at which we have arrived, and the measures which we recommend for adoption, are fully stated.

2. It is of great importance that very early orders should be issued on this reference, as the Hissar work has been completed, and the party which was employed thereon has as yet received no definite orders concerning its duties during the coming winter.

3. As the proposals now submitted do not contemplate the extension of the Hissar system to the Ferozepore district, I am suspending the manufacture of concrete blocks in Ferozepore. Such as have been made will be utilised for settlement marks, and perhaps some can be sold to the Canal Departments (District and Sirhind).

I also enclose a file of non-official papers* which passed between myself the Surveyor-General and his principal officers before the conclusions stated in the joint memorandum were arrived at. I request the favour of the return of these non-official papers after the Financial Commissioner has seen them.

* Not printed, and does not accompany.

**Joint Memorandum by Colonel G. C. DePree, Surveyor-General, and Lieutenant-Colonel E. G. Wace, Commissioner of Settlements and Agriculture in the Punjab, on future Survey work in the Punjab Province.**

The question for consideration, the linking together of the work of the Survey of India and Revenue Record Agency in the Punjab.

In the Government of India's Circular No. 45 S., dated 4th September 1882, among other important matters the following principle was laid down, that there should be adequate co-operation between the Survey of India and the local Revenue authorities of each province, with the view—(i) that the data of topographical surveys be made available as the foundation of cadastral maps; and (ii) that the results of cadastral surveys be made available for the revision of small-scale topographical maps.

Proceedings, Punjab Government, Revenue and Agriculture (Revenue) Department, No. 1 of September 1883.

2. It has been decided in a correspondence arising out of this resolution that the system of cadastral survey at present followed in the Punjab shall be adhered to. Under this system each village is surveyed by its own patwári, supervised usually by the Settlement Department. We therefore have to establish a connection between the work of the Survey of India and the patwári maps.

And secondly, the execution of a river survey in a form permanently useful for the establishment of boundaries in alluvial estates.

This is the main question which has been considered by us. But the action of the great rivers of the Punjab raises another question of hardly less administrative, or rather judicial, importance. The autumn floods on these rivers spread over alluvial basins varying from 2 to 12 miles in width, involving sudden changes in the surface and character of the lands submerged, and sweeping away all marks by which the lands can be identified. In such alluvial tracts the boundaries of properties are open to endless dispute, unless there is a survey record based on permanently-marked stations in situations removed from the action of the river, from which stations the boundaries of the alluvial properties can be projected and restored as required from time to time. No such record as yet exists; and owing to the great breadth of these alluvial river basins, it cannot be supplied by the simpler methods of survey to which the patwári work is confined.

Recent experience available to assist us in arriving at a satisfactory conclusion: (1) the Hissar Topographical Survey.

3. To consider the main question first, our conclusions on the subject have been much facilitated by the experience recently gained—

(i) by the Survey of India in the topographical survey of the Hissar district;

(ii) by the Punjab Revenue Department in its recent settlement operations.

Proceedings, Punjab Government, Revenue and Agriculture (Revenue) Department, No. 1 A. for October 1882; and Government of India's No. 524S., dated 16th December 1882.

At the same time as the Government of India issued the Circular quoted at the commencement of this note, it had been directed by Government, on the recommendations of the Deputy Surveyor-General and Settlement Commissioner, that the party of the Survey of India employed in Hissar should, in addition to their topographical work—



(i) make a traverse survey of the boundary of each village;

(ii) run additional traverses inside each village in such a manner that the boundary traverses and additional traverses taken together should supply a complete net-work of traverse stations, of which no station should be more than half a mile distant from the adjoining stations; that is to say, each village was to be cut up into irregular quadrilaterals, of which the sides would not exceed half a mile in length;

(iii) mark all traverse stations permanently with concrete blocks, size 18″ × 6″ × 6.″

This work is now practically finished, and the opinions of the Deputy Superintendent in charge and of the higher officers of the Survey of India as to its value and economy are on record in the papers, official and unofficial, which we have considered. It is very efficient for the object in view, but it supplies a much larger number of permanent stations than is really necessary as a safe foundation for plane-table work, and is by so much unnecessarily expensive. It has cost per square mile—

| | Rs. |
|---|---|
| Boundary traversing ... ... ... ... | 10 |
| Interior " ... ... ... ... ... | 11½ |
| Permanent marks ... ... ... ... | 3½ |
| Topography and maps ... ... ... ... | 12 |
| Total ... ... | 37 |

It must be admitted that some unnecessary expenditure has been incurred in this district, and that the system to be adopted in future and for the rest of the province should be much cheaper. The topography should be taken mainly from the patwári maps; and as financial considerations urgently demand the restriction of the costly scientific work to the lowest necessary limit, there must be less traversing and fewer permanent marks.

Recent improvements in the method of the patwári survey.

4. On the other hand, during the past two years a method of procedure has been introduced into the patwári survey which appears to be well suited to an open country like the Punjab, and which, equally with the Hissar system, supplies a rigid skeleton on which the cadastral survey can be based. A base line, usually 350 yards (200 *kadams*) long, is carefully measured out on level ground near the centre of the village, its extremities being marked by small pakka pillars. From this base line the village is marked out into squares, of which the sides are equal to the length of the base line, the accuracy of each square being carefully tested by measurement of its four sides and two diagonals. The corners of the squares are marked by wooden pegs, which of course disappear soon after the field measurements have been completed. But no field measurement work is done in a village until the whole village has been thus marked out and the squares have been tested and found accurate. And once the field measurements have been made, the corners of any square can easily be marked out again on the ground by the aid of the field map. The system does not present the same scientific advantages as that recently followed in Hissar; but it supplies a rigid skeleton of an accurate character, on which the cadastral survey can be built up, and subsequently amended as required from time to time. Its cost is practically *nil*. And if we provide in addition two or three traversed stations in each village, of which the data have been accurately recorded by the observations of the Survey of India, and the sites of these stations are permanently marked and accurately shown in the patwári maps, these stations will sufficiently connect the topogra-

phical work of the Survey of India and the patwári's cadastral work; and will make it possible for the Survey of India to incorporate into their 2-inch sheets the results of the patwári survey.

Inquiry into the value of the data recorded by previous surveys as a basis for future revision work in the Punjab.

5. The next point for consideration was this: seeing that there is no district in the Punjab which has not at some time or other during the past 40 years been worked over by a revenue survey, how far is it necessary for the purpose just described to undertake new traverse operations; and would it not be possible to utilise the traverses of the previous surveys? [It should be remembered that the districts with which we are most immediately concerned are the central and sub-Himalayan districts, which were surveyed before the year 1860.] To this end the Deputy Surveyor-General was asked to examine the records and maps of these surveys in the office of the Survey of India. His report is as follows:—

"I have had the records of old surveys of the Punjab, which were executed between 1846 and 1855, examined, and find that the only numerical data which exist are the co-ordinate values of the traverse *stations* round the village boundaries. The field-books are not in existence (except those in district Gujránwála and in these no reference to permanent marks can be traced), and there is no documentary evidence to show that permanent marks were built at the triple junctions or elsewhere at the time of the survey. The only means of judging whether the traverse stations at triple junctions of villages coincide with actual sites of the triple junctions are the village maps which are on the scale of 4 inches to the mile. I have had one volume of the maps of the Ferozepore district, taken at hazard out of six volumes which comprised the whole district, carefully scrutinized. The results, details of which will be found in a tabular statement A* attached, shows that an average of two-thirds of the triple junctions of 170 villages are not coincident with the corresponding traverse stations, and therefore it follows that there is no numerical data on record of that proportion of the triple junctions. Nor can it be stated with any certainty that the data for the remaining one-third portion of the triple junctions is accurate, for the assumption of their coincidence with the traverse stations is based merely on the scrutiny of the 4-inch village plots. Moreover, if the permanent marks were put down after the traverse survey was done, which is quite possible, the accuracy of the data of those triple junctions is still less reliable, as in that case it is questionable whether they are in the positions exactly occupied by the station marks. On examining the detailed list A it will be observed that although the average proportion of the triple junction in each village, of which the data may be said to be on record, is one-third, there is absolutely no data for any of the triple junctions in 37 out of the 170 villages. From a cursory inspection of the remaining volumes of the Ferozepore district village maps, the proportion of triple junctions of which the data is available appears to be about the same.

* Not incorporated in this memorandum.

"Colonel Wace appears to think (*vide* paras. 4, 8 and 9 of his letter) that existing stations of an old traverse may be supplemented where necessary by more stations. This can only be done effectually when contiguous traverse stations of an old survey can be identified on the ground. To interpolate new stations between the permanent marks of an old survey which are not directly connected is practically more difficult, tedious and expensive than to execute the traverse anew."

This last opinion is supported by the experince of Colonel Wilkins, who, after himself surveying the Karnál and Delhi districts in 1871—1874, was engaged in 1879 in the Jumna Riverain Survey, but found himself unable to



utilise for the purpose his former traverse work on the west bank of the Jumna. But the Deputy Surveyor-General adds that the village traverses of the old Revenue Survey could perhaps be used as a basis whereon to compile the patwári maps after reducing them to the 2-inch scale. The conclusions arrived at are somewhat discouraging. But we consider it of the greatest importance that they should be put prominently forward and be thoroughly understood. The total expenditure on past surveys in the Punjab, if added up, would be found to amount to a very large sum. Yet this expenditure has yielded no permanent data by the aid of which either the topographical or the cadastral maps can be from time to time revised, and very little which can be utilised as a basis for the many minor operations of survey (canal, road, railway, drainage and others) which must necessarily recur continually under British administration. We desire to speak with deference of the work of our predecessors. It was often carried out under great difficulties, and under administrative conditions very much less favourable than those which now exist. But speaking in respect of future operations, and equally on the ground of administrative efficiency and financial economy, we urge that stations traversed by the Survey of India should invariably be permanently marked. Take the case of the Hissar survey, of which the cost per square mile is stated above in paragraph 3. It is the traversing that is the expensive and difficult and (it may be added) the most valuable part of the survey. Add a little expenditure for permanent marks, and the traversing is made permanently available for all future operations. Omit the expenditure on the marks, and not only the permanent value of the survey but also its most frequent results in the way of facilitating and cheapening the survey operations of other departments are sacrificed.

Recommends a modified skeleton traverse survey utilising tri-junction platforms, and observing two in each village.

6. We conclude that the topographical maps of the Punjab cannot be adequately revised, nor can the results of the patwári survey be conveniently incorporated in those maps unless a new, though restricted, series of traversed stations be observed and permanently marked in each district. And we therefore recommend that what may be termed a modified skeleton traverse survey be made in each district, usually in advance of settlement operations. The object of the survey would be to determine the position of at least two tri-junction platforms in each village. No offset work would be done, and the traverses would be run as directly and simply as possible. Under this plan each district would be divided into a certain number of main circuits; and these again into a convenient number of minor circuits. The traverse stations of both main and minor circuits would be placed as far as possible on village tri-junction platforms, which are already permanently marked throughout the Punjab, and main and minor circuits would be together so arranged as to give two traverse stations in each village. If in a few instances the stations cannot be placed on tri-junction platforms, such stations would be marked by concrete blocks. A traverse survey of this nature can be executed for a cost of from Rs. 8 to Rs. 12 per square mile; and it will both enable the Survey of India to utilise the topography of the patwári maps and also form a sufficient basis whereon minor administrative surveys for roads, canals, railways, &c., can be from time to time added.

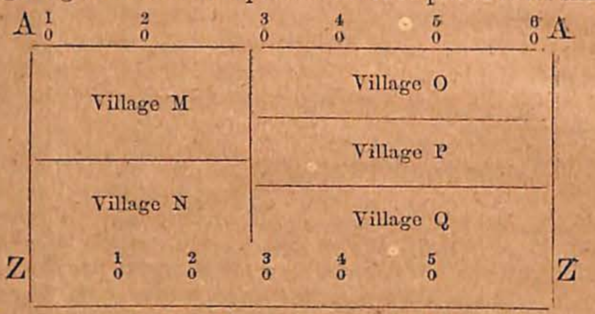
Proposals in respect of river surveys.

7. But, as explained in paragraph 2 in the alluvial basins of the Punjab rivers, a more complete survey is essential. We require in these basins—

(*i*) along each side of them a series of permanent marks (with their data) so situated as to be safe from destruction by the action of the river;

(*ii*) a survey of the village boundaries which lie in the alluvial basin; the said survey being projected from the marks which lie outside the basin, and recorded in such a form that the ordinary revenue agency of the country (*kánúngos* and *patwárís*) shall be able by working from the permanent marks on the edge of the alluvial basin to restore easily any boundary in that basin which the river may have obliterated.

The following rough sketch will explain what is required in its simplest form:—




A 1 to A 6 are permanent stations on the east bank of the river; Z 1 to Z 6 the same on the west bank of the river, both lines being safe from river action. The river bed is, say, 4 miles wide. Between these two lines, A and Z, it is impossible to maintain permanent marks. But if the boundaries lying between lines A and Z are surveyed, the survey can be recorded in such a form that so long as the stations A 1 to A 6 and Z 1 to Z 6 are preserved, the intervening boundaries can be restored as often as the river obliterates them.

For making of this original survey we must employ surveyors of a higher class than patwárís. It cannot be done except by parties of the Survey of India, or by an agency of equal attainments. But the survey having been once made, the record and data thereof can be put into a form which the ordinary revenue agency of the country can use with ease as occasion arises.

Establishment proposed; its organisation and method of work.

8. For the carrying out of the measures thus proposed, we recommend the following establishment:—

| | | Rs. |
|---|---|---|
| (i). | Deputy Superintendent of Survey, his office and contingencies | 18,850 |
| (ii). | Two traverse parties, @ Rs. 16,910 each ... ... ... ... | 33,820 |
| (iii). | Two parties for test and revision of topography, @ Rs. 9,700 each | 19,400 |
| | Total per annum ... | 72,070 |

The details of each traverse party would be—

| | Rs. |
|---|---|
| 1 Surveyor with allowances ... ... ... ... ... ... ... | 5,040 |
| 1 Assistant ditto ... ... ... ... ... ... ... | 3,030 |
| Sub-surveyor, menials and other charges ... ... ... ... ... | 8,840 |
| Total ... | 16,910 |

The details of each party for test and revision would be—

| | Rs. |
|---|---|
| 1 Assistant Surveyor and allowances ... ... ... ... ... | 3,680 |
| Sub-su[illegible]or, menials, &c. ... ... ... ... ... ... | 6,020 |
| Total ... | 9,700 |



These details are stated as estimated by the Deputy Surveyor-General. But the novel character of the work should be plainly recognised. The several parties will frequently be employed in separate districts; and thus the personal responsibility of the surveyors in charge of each party will be developed to a greater degree than has been usual in the previous work of the Survey of India. The Deputy Superintendent of Survey should be required to recognise this, and also in all other respects to organise his establishment suitably to the work on hand. To this end a large discretion should be allowed to the Deputy Superintendent, but with this reservation he should be subordinated in the usual manner to the chiefs of his Department. He should also be in direct communication with the Financial Commissioner of the Punjab, and he should ordinarily respond to the wishes of that officer in respect of the order in which work shall be taken up.

One of the traverse parties will be required for riverain work. The other should be employed in the Ferozepore district.

The parties for test and revision should be employed in the first instance in compiling the patwári maps of districts recently settled,* utilising for the purpose the village traverses of the old revenue survey, as suggested by the Deputy Surveyor-General.† But this should be regarded as an exceptional operation; and when the districts recently settled have been disposed of, these parties will take up the patwári maps of the districts through which the traverse party will by that time have worked.

* Ráwalpindi.
Hoshiárpur.
Jullundur.
Ludhiána.
Umballa (in progress).

† See latter portion of para. 5 above.

This establishment to be sanctioned as a permanency.

9. It should be clearly understood that the establishment is sanctioned not for the survey of a particular district, but in order to (i) establish a sufficient series of survey stations throughout the Punjab, and (ii) correct and complete to date the topographical map of the Punjab, partly by utilising the patwári maps, and partly by adding details omitted from those maps. And it will further be for the Deputy Superintendent in charge, after his operations have been established, to suggest to the authorities some convenient system whereby all the minor surveys executed in the province by other departments may be made available to him for incorporation into the 2-inch sheets of the province.

The full establishment can be organised from October next.

10. It should be added that the full proposed establishment can be organised immediately, or after October next, on the return from Burma of one-and-a-half cadastral parties.

The method by which the topography of the patwári maps will be incorporated.

11. There is another detail of an important character which deserves prominent mention in this place. The topography of the patwári maps cannot be incorporated into the maps of the Survey of India until it has been tested. It will be a principal duty of the surveyors' parties to test the topography.

Two proposals in connection with this have been considered by us—

(i). The first proposal was elaborated by the Deputy Surveyor-General and Lieutenant-Colonel Wace in communication with each other. It was that copies of the patwári field maps omitting field boundaries should be given to the surveyor, who would then himself, or through his subordinates, check the topography and add such details as the patwári had omitted. The copies would then be reduced during the recess season to the 2-inch scale.

(ii). The second proposal has been advanced by Lieutenant-Colonel Coddington, the officer who will have charge of the Punjab work, and is described by him as follows:—

"I am altogether adverse to the examination of the patwári maps, as a most unnecessary and costly proceeding. The patwári maps, as soon as made over to the Deputy Superintendent, should be at once reduced to the 2-inch scale, by photography if possible, as the manual labour will be great. The reductions should then be examined *in situ*, the object being to get trustworthy topographic maps, and not to prove whether the patwári survey is correct up to its scale. If the large-scale maps be examined critically, discrepancies will be found that may after all prove of no importance for the smaller scale; yet the surveyors would not be justified in passing them, and much time would be wasted."

We recommend that Colonel Coddington's plan be followed. There is much force in the remarks by which he supports it.

Head to which the cost of the work should be debited. Government of India's No. 859, dated 24th February 1883 (Department of Finance.)

12. Of the work thus recommended, only the riverain traverse work can be classed as revenue survey. The rest is purely topographical. And it should be borne in mind that the topographical part of the work will utilise free of all charge the topography of the patwári maps. Apparently under paragraph 4 (2) of the orders quoted in the margin,* three-fourths of the total cost of the whole Punjab party will be chargeable to topographical survey, the rest to revenue survey.

* Government of India Resolution No. 859 of 24th February 1883.

Revision of the maps of the protected Sikh States.

13. A question is pending relating to the revision of the atlas sheets containing the protected Sikh States. It will be convenient if this is allowed to stand over until the Punjab work has been organised on the basis herein proposed. When this has been done, we think it will be easy for Colonel Coddington, who will be in charge of the Punjab work, to make convenient and inexpensive proposals for revising the maps of these Sikh States.

Recess location of Punjab party.

14. We think it as well further to mention that the isolation of the Punjab party at Murree during the recess is not to the interest of the service. The arrangement was convenient when there were no railways. But it would now be much preferable if this party were to spend the recess at Simla, which is as accessible from Lahore as Murree, and where the party would be in direct communication both with the Punjab Government and with the summer head-quarters of the Survey of India.

Punjab survey party should be recruited with the natives of the Punjab.

15. In conclusion, we note that it is considered a matter of importance that after the first organisation of the party no natives of India shall be entertained in it who are not natives of the Punjab Province. If this principle is kept in view, the Punjab survey party will become a kind of school, whence men who have done eight or ten years' continuous surveying, and are getting tired of it, may be transferred to the land revenue agency. In this way this survey party will exercise a salutary influence on the efficiency of the land revenue establishment.



Urges the necessity of establishing proper arrangements for the instruction of kánúngos and patwárís in village survey.

16. And this leads us to remark that we attach the greatest importance to the establishment of some sound system for the instruction of the kánúngos and patwárís in village survey work. The success of the Punjab system of survey and record is staked upon the ability of the land revenue administration to maintain the efficiency of the kánúngos and patwárís as practical surveyors. Settlement operations will be in the future less frequent than they have been during the past twenty years. And some arrangements, under which every person appointed to these posts shall be put through a practical course of surveying shortly after his appointment, are indispensable. No such arrangements at present exist. If this matter is neglected, it is certain that the standard of efficiency at present claimed for the patwári maps will not be maintained, and the utilisation of the patwárís as village surveyors will become increasingly difficult.

Early orders requested, in order to provide for next season's work.

17. We solicit very early orders on the proposals embodied in this note. The survey of the Hissar district has been completed, and until orders are passed on our recommendations, the Deputy Superintendent in charge of the Hissar party cannot make arrangements for work either in Ferozepore or elsewhere.

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Addendum to Joint Memoradum by Colonel G. C. DePree, Surveyor-General of India, and Lieutenant-Colonel E. G. Wace, Commissioner of Settlements and Agriculture, Punjab, dated 12th and 16th June 1884.

Additional Note by Surveyor-General.

After much discussion I have, in conjunction with the Settlement Commissioner of the Punjab, signed the joint note. The scheme we have to submit for the approval of the Government is of the nature of a compromise between the rigorous canon of the Survey of India, whereby it is held that no survey should be carried on for any purpose without a preliminary foundation of permanent marks having been made on which to base and build up the subsequent operation of detailed measurement on the one side, and on the other side the declared inability of the Punjab Government to provide the necessary funds for a complete traverse survey. The "modified skeleton traverse," by means of which at least two permanent marks in each village will be fixed by angular and numerical measurements to be computed out on rigorous principles, is the outcome of this compromise.

2. This compromise is possible (1) on the acceptation of the assurance of the Settlement Commissioner, to the effect that his settlement maps are so accurately surveyed that they are capable of being combined into a general map without causing distortion or overlapping; and (2) on the consideration that the physical features of the plains of Punjab are of so simple a nature that the detail measurement of the patwárís will allow of their delineating those features which, had they been more intricate, would have required the powers of thoroughly trained surveyors.

3. It must not be forgotten that the system of reducing the maps of the Settlement Department and combining them in a topographical map is no novel one. It has been in use for many years in the Guzerat party. Advocates for utilising those maps have had their way in opposition to the practical surveyors of this Department, who have maintained that the process is much more troublesome, and perhaps not less expensive than a new survey would have

been. Hence I advocate that the scheme now agreed upon shall be considered as tentative only until the test of practical working has been applied to it.

4. With regard to the proposal to transfer the Punjab party from Murree to Simla. While acknowledging the advantage of the step, I would wish to point out that the measure will inflict a permanent increase of expenditure on the members of the party, Murree being cheap and Simla a notoriously dear place, and it will be considered a hardship therefore. I would in consequence urge that the surveyors shall be granted a local allowance, and generally be placed under the same conditions as the most favoured servants of the Government.

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No. 210, dated Lahore, the 18th September 1884.

From—H. C. FANSHAWE, Esquire, Officiating Junior Secretary to Government, Punjab,

To—The Secretary to the Government of India, Revenue and Agricultural Department.

Punjab Government's No. 260, dated 17th November 1883.

Financial Commissioner's No. 835, dated 28th July 1884, and enclosures.

In continuation of previous correspondence ending with your endorsement No. $\frac{500}{1051}$ of 31st October last, I am directed by the Lieutenant-Governor to submit, for the information and approval of the Government of India, a copy of the papers noted in the margin, in which final proposals are made for the systematisation of future survey operations in the Punjab, and the utilisation of the results of the professional survey for the purposes of revenue measurements.

2. Sir Charles Aitchison is of opinion that the scheme which has been worked out by the Surveyor-General and Lieutenant-Colonel Wace is a well-considered one; and as it is in entire accordance with the principles laid down by the Government of India and the views expressed in my letter No. 216 of 7th September 1883, His Honor has no hesitation in recommending it for the approval of the Government of India as the system to be followed in future in the Punjab.

3. The general features of the plan now proposed are, *first*, that there should be a provincial survey party in closer relation to the province than has hitherto been the case, and, secondly, that this party should be employed upon three kinds of survey work, *viz.*, (1) the preparation of traverse work for use by settlement parties, (2) the revision of district maps by means of maps reduced by photography from the village maps, and (3) the conduct and completion of riverain surveys. In the case of the first and third operations special attention will be devoted to securing permanent results by the careful record of permanent survey works; while by means of the second operation the district and provincial maps will be regularly and satisfactorily kept up to date.

4. For the above work two traverse parties will be required, and two parties to test the revision of topography. The cost of these parties and of the necessary controlling staff is put at Rs. 72,070 per annum, of which ¾ths will, it is understood, be debited to topographical and ¼th to revenue survey in accordance with the rules laid down by the notification of the Government of India, in the Department of Revenue and Agriculture, No. 859 of 24th February 1883, as only the riverain survey work can be properly classed as Revenue Survey. The Lieutenant-Governor is willing, however, to bear a proportion of the hill allowances which the Surveyor-General thinks should be granted to the Punjab parties if they are required to spend the summer session at Simla, should the Government of India think this desirable.



5. His Honor agrees with the Financial Commissioner that the recommendation made by Colonel DePrée and Colonel Wace, that the revision of the map of the Cis-Sutlej country should be allowed to stand over for a time, should be accepted.

6. As early orders are required to enable the survey party at present in recess at Murree to commence operations this cold weather, the Lieutenant-Governor has authorized the Financial Commissioner to arrange with the Surveyor-General for the immediate issue of orders in accordance with the scheme now submitted, and he trusts that this will meet with the approval of the Government of India.

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No. 211, dated Lahore, the 18th September 1884.

From—H. C. FANSHAWE, Esquire, Officiating Junior Secretary to Government, Punjab,

To—The Senior Secretary to Financial Commissioner, Punjab.

In reply to your letter No. 835 of 28th ultimo, I am directed to forward, for the information of the Financial Commissioner, and for guidance as far as paragraph 6 thereof is concerned, a copy of a letter No. 210 of to-day's date, addressed to the Government of India, in the Department of Revenue and Agriculture, on the subject of future survey operations in the Punjab.

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No. 585—102-4 S., dated Simla, the 8th October 1884.

From—E. C. BUCK, Esquire, C.S., Secretary to the Government of India, Rev. and Agri. Dept.,

To—The Offg. Junior Secretary to Government, Punjab.

In reply to your letter No. 210, dated the 18th ultimo, I am directed to state that the Government of India approves of the proposals for the conduct of future survey operations in the Punjab. The Government of India is hardly satisfied that sufficient use is to be made of survey stations in cadastral maps, but it has decided to accept the arrangement proposed as the one most acceptable to the local authorities.

2. There is no objection to the Punjab survey parties recessing at Simla, and the Surveyor-General will be informed accordingly; but no special hill allowances can be sanctioned.

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Endorsement by the Punjab Government.

No. 244, dated 27th October 1884.

Copy forwarded to the Senior Secretary to the Financial Commissioner for information and guidance, in continuation of the letter from this office No. 211, dated the 18th of September 1884.

2. One hundred copies of the joint memorandum by Colonels DePrée and Wace, which formed one of the enclosures to the above letter, are forwarded herewith, for distribution from time to time as survey operations are taken up in fresh districts.